

INSTRUCTION MANUAL FOR
MODEL No. 1005-10R-C1-L2

SERIAL No. 17/3127



BETA ELECTRIC CORP.
NEW YORK, N. Y.

NOTE:

Please read the entire instruction manual thoroughly before attempting to operate the unit.

If this is not convenient, please read the operating instructions completely before applying power for the first time.

NOTES

These are the notes of the
meeting held on the 1st of
the month of the year.

It was decided to hold the
next meeting on the 1st of
the month of the year.

The following is a list of changes or additions to be made in the Series 1000 Power Supplies Instruction Manual, dated February, 1956.

<u>LOCATION OF CHANGE</u>	<u>DESCRIPTION</u>	<u>DATE</u>
✓ Title page	Last item at bottom of page should read: (MAXIMUM INPUT POWER OF 1,000 VOLTAMPERES)	6/56 - hk
Pg.2, add at end of Section I:	-4000 Nominal 400 cycle input power, nominally 110 volts.	6/56 - hk
✓ Pg.8, SECTION III, item a, line 2:	Should read: " . . . at currents ranging from 1 milliampere at 60,000 volts"	6/56 - hk
✓ Pg.9, SECTION III, item a, (located below listing of de- signs available):	Should read: "For -R, -R(CT) designs, polarity reversal . . .)	6.56 -hk
✓ Pg.9, bottom of page:	Add: "xCOVAT - See note, page 7".	6/56 - hk
✓ Pg.13, item 9, II	Should read: "ZERO START INTERLOCK DESIGNS".	6/56 - hk
✓ Parts List, pg. 3	Add: E40 - Per β-a-40E Location: Chassis Function: Overvoltage protection spark gap.	3/57 - hk
✓ Parts List, pg. 4	Add: J5,6 - 62J - E.F. Johnson #105-703 Location : Chassis Function : Polarity reversal.	3/57 - hk
✓ Parts List, pg. 6	Add: P5,6 - 63P - E.F. Johnson #105-303 Location : Chassis Function : Polarity reversal.	3/57 - hk
✓ Parts List, pg. 10	Add: TB 5- 4TB - Precision Metal Products #2604 terminal board. Location : VR tube bracket on panel Function : Mounts components.	3/57 - hk
✓ Parts List, pg. 4	Delete: H7, bracket.	4/57 - hk
✓ Parts List, pg. 5	Add: K2 - Allen-Bradley Bull. 860, #860BOD106A. Location : Panel Function : Hold-On relay and output shorting.	4/57 - hk
✓ Parts List, pg. 5	Add: K4 - Potter-Brumfield MR14A. Location : Panel Function : High voltage on and holding relay.	4/57 - h

<u>LOCATION OF CHANGE</u>	<u>DESCRIPTION</u>	<u>DATE</u>
✓ Parts List, page 7	Delete: S4, switch.	4/57 - hk
✓ Parts List, page 10	Add: TB10 - Cinch Jones Terminal strip #3-140-Y. Location : Chassis Function : Interconnection for filter sections, when used.	4/57 - hk



BETA ELECTRIC CORP.

INSTRUCTION MANUAL SERIES 1000 POWER SUPPLIES

SHOP
COPY

AIR & OIL--INSULATED UNITS
ONE-SECTION CONSTRUCTION
FOR RACK MOUNTING, ENCLOSED
OR PORTABLE APPLICATIONS

CONTROLLED
DOCUMENT

FROM 0-1,000 VOLTS DC
TO 0-60,000 VOLTS DC
AT CURRENTS FROM 1 MILLIAMPERE TO 600 MILLIAMPERES
(MAXIMUM OUTPUT POWER OF 600 WATTS)
(MAXIMUM INPUT POWER OF 1,000 ~~WATTS~~ AMPERES)

(A)

TABLE OF CONTENTS

	<u>Page</u>
SECTION I Scope of This Manual	1
SECTION II SPECIFICATIONS	
A: ELECTRICAL	
(a) Input voltage	2
(b) Input voltamperes	2
(c) Output voltage	2
(d) Output current	2
(e) Polarity	3
(f) Output ripple	3
(g) Regulation	4
(h) Line voltage stability	4
(i) Meters	4
(j) Safety features	6
(k) Protective features	6
(m) Controls	7
(n) Pilot lights	7
(o) Auxiliary feature	8
(p) Power connections	8
B: MECHANICAL	
Mechanical specifications	8
SECTION III GENERAL	
Discussion	8, 9
SECTION IV THEORY OF OPERATION	10, 11
SECTION V OPERATING INSTRUCTIONS	
A: MECHANICAL	11, 12
B: ELECTRICAL	12, 13
SECTION VI PRECAUTIONS	14
SECTION VII DRAWINGS	
Listing of drawings	14, 15

SECTION I - - SCOPE OF THIS MANUAL

This is an instruction manual for all the Beta Electric Corp. Series 1000 Power Supplies, covering the following designs:

- N High voltage NEGATIVE polarity.
- P High voltage POSITIVE polarity.
- (-R) High voltage REVERSIBLE polarity.
- CT High voltage CENTER TAPPED, giving $\pm 1/2$ total voltage to ground, from each of the two high voltage leads.
- R(CT) Combining -R and -CT features.

and with the following special features:

- (-C1) Line voltage stabilized to $\pm 1.5\%$.
- C2 Line voltage stabilized to $\pm 0.25\%$.
- E Supply mounted in a desk panel cabinet rack.
- EP Portable power supply with enclosure.
- F Fine output voltage control, to approximately 0.03% of maximum voltage.
- HT Automatically timed HIGH VOLTAGE ON period, 1 second to 3 minutes.
- L1 0.1% rms ripple at maximum rated voltage and current.
- (-L2) 0.01% rms ripple at maximum rated voltage and current.
- L3 0.001% rms ripple at maximum rated voltage and current.
- M2 Dual range load current meter.
- M3 Triple range load current meter.
- NZb Zero start interlock, with bypassing pushbutton.
- OL1 Adjustable overload relay, approximately 0.2 to 1.2 $9 \pm 0.75 A$ times rated current.
- OL2 Adjustable overload relay, approximately 0.02 to 1.2 times rated current.
- OV1 Adjustable overvoltage relay, approximately 0.4 to 1.15 times maximum voltage.
- OV2 Adjustable overvoltage relay, approximately 0.1 to 1.15 times maximum voltage.

- | | |
|-----------|---|
| -V2 | Dual range kilovoltmeter. |
| -V3 | Triple range kilovoltmeter. |
| -Z | Zero start interlock on HIGH VOLTAGE CONTROL. |
| (220) | 220 volts (nominal), 50/60 cycle input. |
| (110/220) | 110/220 volts (nominal) 50/60 cycle input. |

* * * * *

SECTION II - - - SPECIFICATIONS

A: ELECTRICAL:

NOTE: See drawing β -c-1000-1 for detailed specifications of particular model.

- (a) Input voltage: I: (Standard designs): 105-135 volts, 50/60 cycles, single phase.
II: (220 designs): 195-240 volts, 50/60 cycles, single phase.
- (b) Input voltamperes:* The input voltamperes at maximum rated power is approximately twice the dc output voltamperes.
- (c) Output voltage: The output voltage is continuously variable from zero to maximum rated voltage. This voltage is designated by the three digits after the "1" in the Model designation, thus:

Model 1002 = 0- 2,000 volts
Model 1015 = 0-15,000 volts
Model 1030 = 0-30,000 volts

etc.

- (d) Output current: The maximum output current available continuously at maximum rated voltage is indicated in MILLI-AMPERES in the Model number, by the number AFTER the hyphen of the voltage designating 1000 number, and before the polarity designating letter, thus:

-1N = 1 milliampere (negative polarity)
-10R = 10 milliamperes (reversible polarity)
-250P = 250 milliamperes (positive polarity)

etc.

- - - - - cont'd. page 3 - - - - -

*This applies to units without line voltage regulators, with -C1 or -C2 features, due to "resonant" currents, the ratio may be as high as 5/1, at low output power ratings (less than 30 VA).

(e) Polarity: (-N DESIGNS):

High voltage terminal NEGATIVE with respect to ground (chassis and panel).

(-P DESIGNS):

High voltage terminal POSITIVE with respect to ground (chassis and panel).

Z (-R DESIGNS):

High voltage terminal REVERSIBLE with respect to ground (chassis and panel).

(-CT DESIGNS):

Two high voltage terminals, one NEGATIVE, one POSITIVE with respect to ground (chassis and panel), at 1/2 the rated voltage. **

(-R(CT) DESIGNS):

Either full voltage NEGATIVE or POSITIVE can be obtained, per (-R), and also (-CT) feature is available.

(f) Output ripple:

(Air Designs. For oil designs ripple approx. twice that for air).

*(I) STANDARD DESIGNS

(a) NO LOAD: Less than 0.1% at rated voltage and no load. (ALL models).

(b) FULL LOAD:

10 ma or less maximum rated current:
1/4% per milliampere at maximum voltage

50 ma or less maximum rated current:
less than 1/4% per 5 milliamperes at maximum voltage.

100 ma or less maximum rated current:
less than 1/4% per 10 milliamperes at maximum voltage.

300 ma or less maximum rated current:
less than 1/4% per 30 milliamperes at maximum voltage.

600 ma or less maximum rated current:
less than 1/4% per 60 milliamperes at maximum voltage.

(II) -L DESIGNS:

(-L1 designs) 0.1% or less, at maximum rated voltage and rated load.

✓ 0.25V (-L2 designs) 0.01% or less, at maximum rated voltage and current.

----- cont'd, page 4 -----
*On V3 designs, the no-load ripple is 1/4%.

**i.e., 1030-2CT has: one terminal 0 to -15 kv, at 2 ma; one terminal 0 to +15 kv, 2 ma
The outputs are equal at NO LOAD to within 2%, at FULL LOAD they may be unbalanced by 5%.

(f) Ripple, cont'd.

(-L3 designs) 0.001% or less, at maximum rated voltage and current.

STANDARD DESIGNS

(g) Regulation:

Approximately 25% from no load to full load at maximum voltage, except in the higher current power supplies where a choke input filter is used. In these cases, the regulation may be as high as 80%. (This figure will vary widely in a given VOLTAGE range for different maximum current ratings). However, maximum rated current can be drawn at maximum rated voltage from all units. (See drawing β -c-1000-1 for exact value.)

(h) Line voltage
stability:

(I) STANDARD DESIGNS

No stabilization employed; output voltage varies approximately linearly with line voltage changes.

(II) -C DESIGNS

(-C1 designs) Output voltage varies less than 1.5% (with fixed load conditions), for line voltage changes of 100 to 135 volts (117 volts nominal input) or 195 to 245 volts (220 volts nominal input).

(-C2 designs) Output voltage varies less than 0.25% (with fixed load conditions), for line voltage changes of 100 to 135 volts (117 volts nominal input) or 195 to 245 volts (220 volts nominal input.)

(i) Meters:

I: OUTPUT VOLTAGE

All meters are 3" square bakelite case, 3% initial accuracy at ALL RANGES.

NOTE: IN -CT DESIGNS, each meter indicates the output voltage, to ground from its respective high voltage lead. The readings must be added for the TOTAL voltage between high voltage leads.

In -R(CT) designs, one meter indicates the total high voltage output, for -N, -P or -CT operation.

(I) STANDARD DESIGNS

1 kv maximum voltage: 0-1000 VOLTS DC
2 kv maximum voltage: 0-2000 VOLTS DC
3 kv maximum voltage: 0-3000 VOLTS DC
5 kv maximum voltage: 0-5000 VOLTS DC
10 kv maximum voltage: 0-10 KILOVOLTS DC

(i) Meters, cont'd.

15 kv maximum voltage: 0-15 KILOVOLTS DC
20 kv maximum voltage: 0-20 KILOVOLTS DC
30 kv maximum voltage: 0-30 KILOVOLTS DC
40 kv maximum voltage: 0-50 KILOVOLTS DC
50 kv maximum voltage: 0-50 KILOVOLTS DC
60 kv maximum voltage: 0-60 KILOVOLTS DC

(II) -V2 DESIGNS

1 kv maximum voltage: 0-300/1000 VOLTS DC
2 kv maximum voltage: 0-500/2000 VOLTS DC
3 kv maximum voltage: 0-1000/3000 VOLTS DC
5 kv maximum voltage: 0-2000/5000 VOLTS DC
10 kv maximum voltage: 0-3/10 KILOVOLTS DC
15 kv maximum voltage: 0-5/15 KILOVOLTS DC
20 kv maximum voltage: 0-5/20 KILOVOLTS DC
30 kv maximum voltage: 0-10/30 KILOVOLTS DC
40 kv maximum voltage: 0-20/50 KILOVOLTS DC
50 kv maximum voltage: 0-20/50 KILOVOLTS DC
60 kv maximum voltage: 0-20/60 KILOVOLTS DC

(III) -V3 DESIGNS

1 kv maximum voltage: 0-100/300/1000 VOLTS DC
2 kv maximum voltage: 0-200/500/2000 VOLTS DC
3 kv maximum voltage: 0-300/1000/2000 VOLTS DC
5 kv maximum voltage: 0-500/2000/5000 VOLTS DC
10 kv maximum voltage: 0-1000/3000/10,000 VOLTS DC
15 kv maximum voltage: 0-1500/5000/15,000 VOLTS DC
20 kv maximum voltage: 0-2/5/20 KILOVOLTS DC
30 kv maximum voltage: 0-3/10/30 KILOVOLTS DC
40 kv maximum voltage: 0-5/20/50 KILOVOLTS DC
50 kv maximum voltage: 0-5/20/50 KILOVOLTS DC
60 kv maximum voltage: 0-6/20/60 KILOVOLTS DC

2: OUTPUT CURRENT:

All meters are 3" square bakelite case, 3% initial accuracy on ALL RANGES.

NOTE: IN -CT DESIGNS there is no OUTPUT CURRENT meter.

In -R(CT) designs, the OUTPUT CURRENT meter is inoperative when the polarity selector is in the -CT position.

(I) STANDARD DESIGNS

Depending on maximum current rating, the next EQUAL or HIGHER of the ranges listed below, is provided.

0-1, 2, 5, 10, 20, 30, 40, 50, 100, 200,
300, 500 or 600 MILLIAMPERES DC.

... (II) -M2 DESIGNS

(i) Meters, cont'd.

The maximum range is determined per (I), and the next lower ranges are determined by the following combinations, or decade multiples thereof:

0-0.3/1; 0-0.5/2; 0-1/3; 0-1.5/4; 0-2/5;
MILLIAMPERES DC.

... (III) -M3 DESIGNS

The maximum range is determined per (I), and the next lower ranges are determined by the following combinations, or decade multiples thereof:

0-0.1/0.3/1; 0-0.2/0.5/2; 0-0.3/1/3; 0-0.4/1.5/4;
0-0.5/2/5; MILLIAMPERES DC.

- (j) Safety features ✓
- (1) Automatic output voltage shorting mechanism inside the power supply that reduces the output voltage to zero whenever primary power is removed.
 - ✓ (2) Provision for external safety interlock.
 - (3) Series resistance in output circuit, limiting initial short circuit surges available from power supply to approximately 20 times rated maximum current.
 - (4) Safety shield cover over high voltage section.

(k) Protective features:

.. (I) STANDARD DESIGNS

- (1) Fuses in both sides of main line.
- (2) Fuse in primary of high voltage transformer. ✓
- (3) Surge suppressing gaseous discharge devices across dc metering and relaying circuits.
- (4) Overload relay removing power when load exceeds approximately 1.2 times rated current.
- (5) Overvoltage relay or spark gap action removing input power when output voltage exceeds approximately 1.15 times rated maximum voltage as required.

... (II) -OL DESIGNS

(-OL1 designs): Overload trip point continuously adjustable from 0.2 to 1.2 times rated maximum current.

OR:

(-OL2 designs): Overload trip point continuously adjustable over two ranges, as follows, in two steps, approximately: 0.02 to 0.2, and 0.2 to 1.2 times rated maximum current.

(III) -OV DESIGNS

(-OV1 designs): Overvoltage trip point adjustable from approximately 0.4 to 1.15 times rated maximum voltage.

OR:

(-OV2 designs): Overvoltage trip point adjustable from approximately 0.1 to 1.15 times rated maximum voltage.

(m) Controls:

(I) ALL MODELS (1-4)

- ✓ (1) HIGH VOLTAGE OFF & OVERLOAD RESET pushbutton.
- ✓ (2) HIGH VOLTAGE ON pushbutton.
- ✓ (3) HIGH VOLTAGE CONTROL covat*.
- ✓ (4) METER POLARITY SELECTOR switch. (On -R and -R(CT) designs only.)
- (5) CONTROL & FILAMENT POWER toggle switch (tube rectifier units only.)
- OR
- ✓ (5) CONTROL POWER toggle switch (with selenium rectifier).

(II) SPECIAL FEATURES:

- (A) -F DESIGNS:
 - (6) FINE HIGH VOLTAGE control rheostat.
- (B) -HT DESIGNS:
 - (7) HIGH VOLTAGE ON TIME control.
- (C) -M2, -M3 DESIGNS:
 - (8) OUTPUT CURRENT meter range selector switch.
- (D) -NZb DESIGNS:
 - (9) ZERO START INTERLOCK BYPASS pushbutton.
- (E) -OL1 DESIGNS:
 - (10) OVERLOAD TRIP CONTROL rheostat.
- (F) -OL2 DESIGNS:
 - (10) OVERLOAD TRIP CONTROL rheostat.
 - (11) OVERLOAD TRIP CONTROL RANGE selector.
- (G) -OV DESIGNS:
 - (12) OVERVOLTAGE TRIP CONTROL rheostat.
- (H) -V1, -V2 DESIGNS:
 - (13) OUTPUT VOLTAGE meter range selector switch.
- (I) (110/220) DESIGNS:
 - (14) 110/220 VOLTS INPUT selector switch (concealed).

(n) Pilot lights:
(all neon, with
clear faceted
lens.)

(I) STANDARD DESIGNS

- ✓ (1) MAIN FUSES open (2).
- ✓ (2) OVERLOAD.
- ✓ (3) HIGH VOLTAGE ON.
- ✓ (4) HIGH VOLTAGE INPUT TRANSFORMER FUSE blown.
- ✓ (5) EXTERNAL INTERLOCK OPEN.

(II) SELENIUM RECTIFIER DESIGNS ONLY

- ✓ (6) CONTROL POWER.

(III) TUBE RECTIFIER DESIGNS ONLY

- (7) CONTROL & FILAMENT POWER.

(n) Pilot lights, cont'd.

(IV) - Z DESIGNS ONLY

(8) SET HIGH VOLTAGE CONTROL TO ZERO (nameplate only, no neon lamp.)

(o) Auxiliary feature: Standard 2-pronged convenience outlet energized when the input is energized.

(p) Power connections: (1) INPUT: Standard recessed 2-pronged male receptacle, with 6 foot line cord.

(2) OUTPUT: RG 8/U cable, 8 feet long.

(3) GROUND: Screw binding post.

B: MECHANICAL:

(NOTE: See drawing β -b-1000-2 for detailed specifications of particular model.)

Width: All units mounted on standard 19" wide, 1/8" thick steel panel, with W.E. notching for relay rack mounting.

Depth: All units 13" deep.

Finish: Gray hammertone, with zinc-chromite primer.

Height: The height varies from 8-3/4", for a low power unit without auxiliary features, to 21" for a heavy power unit with a line voltage regulator. (See drawing β -b-1000-2 for exact specifications.) Some units supplied in 2 Panel construction, in which case max. height is 29 3/4".

Weight: The weight varies from approximately 40 pounds for a light power, 8-3/4" high unit, to 165 pounds, for a heavy power unit, 21" high, with a line voltage regulator. (See drawing β -b-1000-2 for exact specifications.)

SECTION III - - - GENERAL

a: The Beta Electric Corp. Series 1000 air and oil insulated power supplies, 0-1,000 to 0-60,000 volts dc, at currents ranging from 1 1/2 milliamperes at 60,000 volts, to 600 milliamperes at 1,000 volts, limited by a power rating of 600 watts output, have been specifically designed to provide reliable, safe, high voltage breakdown testers, for insulating materials and television components, B+ sources for power tubes or cathode ray tubes, etc., with unusually long life.

They are also applicable to any application where no more than 0.6 kilowatts of high ** volts dc power is needed, such as nuclear physics research, electro-

cont'd, page 9

** 0-300 volts = LOW VOLTAGE	30,000 - 300,000 volts = VERY HIGH
300 - 3,000 volts = MEDIUM VOLTAGE	VOLTAGE
3,000 - 30,000 volts = HIGH VOLTAGE	300,000 and above = ULTRA HIGH
	VOLTAGE

static painting and precipitation, cathode ray oscillography, etc. Attention has been given to safety without a sacrifice of any convenience in operation. Primary safety features include an overload relay and an automatic output voltage shorting mechanism.

Five basic designs are available:

- a. -N designs: high voltage ~~NEGATIVE~~ ^{REVERSIBLE} with respect to ground.
- b. -P designs: high voltage POSITIVE with respect to ground.
- c. ☒ R designs: high voltage REVERSIBLE with respect to ground.
- d. -CT designs: high voltage CENTER TAPPED with respect to ground; (output voltage to ground from each output terminal $\pm 1/2$ rated output voltage.)
- e. -R(CT) designs combines (c) and (d).

For -R, -R(CT) designs, polarity reversal is effected by changing the positions of a set of leads inside the high voltage section. The leads are accessible by removing a safety shield cover.

b: The basic high voltage circuit employed will be one of the following:

- a. Full-Wave doubler
- b. Half-Wave rectifier
- c. ☒ Full-Wave rectifier
- d. Half-Wave doubler

The circuit for a particular supply is shown in drawing β -c-1000-1.

- c: High voltage dc is controlled by means of a covat* which varies the ac input to the high voltage transformer rectifying circuit.
- d: The power supply is all on one panel, suitable for relay rack mounting, operation in a desk cabinet (-E feature), or mounted in a carrying case as an optional feature (-EP).
- e: The filaments are continuously energized by separate transformers, thus allowing continuous control of the output voltage by means of a covat* referred to in (c) when tube rectifiers are used.
- f: The output voltage and current are metered, with multiple ranges being available in various designs, per the Specifications, Section II, (i), pgs. 5 and 6.
- g: The standard designs include many important safety, protective, control and metering features, listed in the Specifications, ELECTRICAL, Section II, A, pgs. 2 through 8. The standard electrical features are also listed therein.

Special features of an electrical, metering or control nature are available, and listed in Section II of this manual.

* See Note p.7

cont'd, page 10

SECTION IV - THEORY OF OPERATION

All of the circuits and functions of the power supply are quite straight-forward, and can be readily understood by reference to the basic schematic circuit diagram, β -c-1000-1 herewith. (See note in Section VII re drawing nomenclature, pgs. 14 and 15.)

Main ac power and dc circuits are indicated heavily. Light lines represent circuits for controls, meters, filtering or indicating devices. The detailed parts list herewith describes the function of each component.

Several novel features, introduced in 1946 and pioneered by the Beta Electric Corp. which are typical of Beta Electric Corp. engineering, to reduce size and cost of the power supply, and to increase convenience of use, are briefly outlined herewith. In addition, unusual circuit features are described.

1. Blown fuse and open switch indicators

Neon glow lamps, such as I1, shine when the paralleled fuse is blown, or paralleled switch is open, thus indicating immediately the cause of inoperation of the power supply. The lamp holders have built-in resistors, limiting the lamp current to approximately 1 milliampere, so that none of the circuit BEYOND the lamp will be operated by the small current that flows through the lamp.

2. Neon pilot light illuminating resistors

Resistors such as R1 ensure illumination of the adjacent neon glow lamp in case of blown fuse or open switch paralleled by the indicator, and open circuit beyond the resistor. For oil-filled high voltage sections, see notes on page 15 before proceeding.

3. Holding relay for overload protection

Relay K1 pulls in when contacts 3a of the overload relay K3 close momentarily. When K1 is energized, contacts 1b open, de-energizing all of the high voltage circuits; also, contacts 1a close and maintain K1 energized, even though contacts 3a have now opened up, due to contacts 1b having opened, and having removed primary power from the high voltage circuit, thus eliminating the overload condition.

Depressing S1, HIGH VOLTAGE OFF & OVERLOAD RESET, de-energizes K1 and resets the system for operation after the overload.

Pilot light I4, OVERLOAD, is illuminated for the overload condition.

4. High voltage "HOLDING" and "SHORTING"

When the HIGH VOLTAGE ON pushbutton S2 is depressed, solenoid K2 is energized, removing the short from the output, through resistor R5. When the plunger of K2 pulls up, it also closes S4, thus bypassing S2 and allowing S2 to be released, maintaining high voltage.

5. High voltage generating circuits

The high voltage is controlled by the output of covat T1, which varies from 0 to 135 volts the ac input voltage to the high voltage transformer T2. The output of T2 is rectified by means of rectifiers and filters in a circuit that is most economical for the particular application. The circuits employed are:

- (a) Full-wave doubler (most common). *
- (b) Half-wave rectifier (for low power).
- (c) Full-wave rectifier (for high current).
- (d) Half-wave doubler (for very high voltages, low current). **

6. (-R DESIGNS ONLY) Polarity reversal

The high voltage is made positive or negative with respect to ground by means of reversing the sense of the rectifiers. This reversal is accomplished by means of plugs and jacks located on a shelf in the high voltage section.

7. Metering and overload circuits

The output voltage metering circuit consists of resistor R4 in series with meter M1, OUTPUT VOLTAGE, and the series and shunting calibrating resistors.

It is to be noted that the return of this metering circuit is not to ground, but to the "high" end of the OUTPUT CURRENT metering circuit M2. Thus, the output current meter does not indicate the drain of the kilovoltmeter circuit. (This holds only if there is an OUTPUT CURRENT meter range more sensitive than 100 milliamperes full scale).

In series with the OUTPUT CURRENT meter M2 is the overload relay K3. This relay is calibrated with various resistors in series and in shunt, to ensure pull in at the rated currents per Section II, k, I, 4 and II, k, II, page 6.

Capacitor C5 allows the relay K3 to pull in on average current, rather than the large peak currents that flow through the rectifier circuit.

SECTION V - OPERATING INSTRUCTIONS

A: MECHANICAL

1. Open the carton or crate and check all components for visible damage.
2. Remove the safety shield cover from the high voltage section; or, if in a cabinet, (-E or -EP design) remove from the cabinet and then remove the safety shield cover. For oil-filled high voltage sections, see notes on page 15 before proceeding.

-
- * D. L. WAIDELICH, "The Full Wave Voltage Doubler Rectifier Circuit", Proc. of I.R.E., October, 1941, pp. 554-558 incl.
 - ** D. L. WAIDELICH, "The Half Wave Voltage Doubler Rectifier Circuit", Proc. of C.H. GLEASON I.R.E., December, 1942, pg. 535.

REPORT ALL DAMAGE (DETERMINED FROM VISIBLE INSPECTION AND FROM SUBSEQUENT ATTEMPTS TO PUT THE POWER SUPPLY INTO OPERATION) TO THE CARRIER AT ONCE. PLEASE SEND A COPY TO THE BETA ELECTRIC CORP.

THE POWER SUPPLY WAS IN PERFECT OPERATING CONDITION BEFORE IT WAS SHIPPED FROM THE BETA ELECTRIC CORP. FACTORY; ANY MALFUNCTIONING UPON ARRIVAL AT YOUR PREMISES IS DUE TO DAMAGE OCCURRING IN SHIPMENT.

- 3: Check continuity of the high voltage transformer's secondary.
- 4: Check continuity of the high voltage interconnecting wires.
- 5: Remove the tape that binds the output shorting mechanism's plunger, and the rectifiers' plate caps (where used), and also remove any tape used to secure anti-corona nuts during shipment.
- 6: Inspect the various high voltage resistors. Refer to drawing β -b-1000-3 for the components' values, corresponding to the parts' layout of drawing β -b-1000-2.
- 7: Insert the rectifiers into the corresponding sockets, and connect the plate caps. (where tubes are used).
- 8: (-R designs only) Insert the polarity reversing plugs in proper jacks to correspond to high voltage positive or negative, as desired. Refer to drawing β -b-1000-2, for reversing scheme.
- 9: Remove the shorting wires from the meters.
- 10: Wire an external interlock, closed in the SAFE position, across pins of an ordinary 2-pin wall outlet plug that mates with the socket, on the chassis rear, labelled FOR EXTERNAL INTERLOCK.
- 11: Before replacing the safety shield cover, check the unit electrically by following steps V, B, 1-11. If the unit operates satisfactorily, replace the safety shield cover (and replace into the cabinet, if used). Use extra caution when cover is off due to high voltage circuits being exposed.
- 12: Mount the power supply as desired in place.

B: ELECTRICAL:

- 1: Ground the unit by means of the binding post provided on the rear of the chassis.
- 2: Connect the output cable to the load under test

- 3: Turn the HIGH VOLTAGE CONTROL to zero. Check that the CONTROL & FILAMENT POWER or CONTROL POWER switch is in the OFF position.
- 4: Connect the power supply to a source of nominal 117 volts or 220 volts, (depending on the rated input voltage), 50/60 cycles, single phase, (for standard designs, or 400 cycles, for-400C designs), by means of the line cord provided.

(110/220 designs only): Set the 110/220 VOLTS INPUT selector switch on the panel or chassis rear.
- 5: (-R designs only) Set the METER POLARITY selector switch to "+" or "-" corresponding to the setting of V, A, 8, page 12.
- 6: Turn the HIGH VOLTAGE CONTROL to zero. Throw the CONTROL POWER, or CONTROL & FILAMENT POWER switch to ON (when used.)
- 7: (-OL designs only) Set the OVERLOAD TRIP CONTROL to the desired trip current. Refer to drawing β -a-1000-4 for the calibration.
- 8: (-OV designs only) Set the OVERVOLTAGE TRIP CONTROL to the desired trip voltage. Refer to drawing β -a-1000-5 for the calibration.
- 9: (I) STANDARD DESIGNS Set the HIGH VOLTAGE CONTROL to the dial setting corresponding to the desired voltage. Refer to drawing β -a-1000-6 for the calibration. Preferably, start at zero output, and bring up slowly, per step 11.

II: ZERO START INTER-LOCK

~~LOCK~~ DESIGNS:

Set the HIGH VOLTAGE CONTROL to zero.

- 10: Depress the HIGH VOLTAGE ON pushbutton. (In - NZb designs, also press the ZERO START INTERLOCK BYPASS pushbutton for sudden high voltage). Keep button depressed until I4 is extinguished.
- 11: Turn the HIGH VOLTAGE CONTROL clockwise until the desired output voltage and/or current is indicated**.
- 12: TO TURN OFF
 - a. Turn the HIGH VOLTAGE CONTROL to zero (advisable, not mandatory).
 - b. Depress the HIGH VOLTAGE OFF pushbutton.
 - c. Throw the CONTROL & FILAMENT POWER or CONTROL POWER switch to OFF.
- 13: TO RESET AFTER AN OVERLOAD *
 - a. Remedy the condition that caused the overload.
 - b. Turn the HIGH VOLTAGE CONTROL to zero.
 - c. Depress the OVERLOAD RESET pushbutton.
 - d. Repeat steps 7 through 11 above.

* In power supplies where a protective spark gap is used, it will fire if the output voltage is raised much above the rated maximum, and will cause an overload to be indicated.

** NOTE: FOR MULTI-RANGE METER DESIGNS, the METERS ARE PROTECTED AGAINST OVERLOADS ON ALL RANGES.

SECTION VI - - PRECAUTIONS

Following is a resume of the proper precautions that should be taken when using this high voltage power supply:

1: ALWAYS OPERATE WITH A GOOD EXTERNAL GROUND.

2: Be certain that all personnel are properly placed with respect to the high voltage output cable. This means that no one should be within 1/2 foot of the output end, unless he knows exactly what he is doing.

Although a lethal amount of power is not available from the power supply itself, secondary effects due to mechanical movement can be dangerous. Also, if a capacitance greater than 1/4 ufd is being tested at voltages above 10 kv, a lethal amount of stored energy may be available from the load.

3: Turn the HIGH VOLTAGE CONTROL to zero, and allow the OUTPUT VOLTAGE meter to fall below 1 kv, before depressing the HIGH VOLTAGE OFF pushbutton. This is recommended to minimize arcing at the automatic output shorting mechanism, with consequent contact deterioration. Further, it obviates the possibility of unexpected high voltage appearing when the high voltage on pushbutton is again depressed.

In case of emergency, there should be no hesitation to depress the HIGH VOLTAGE OFF pushbutton at once.

SECTION VII - - DRAWINGS

The following drawings are provided with the manual, in addition to the parts list.

Note: Each drawing has designations showing size number, the MODEL NUMBER of the power supply, and the drawing sequence, thus:

- a - "a" size - 8-1/2" x 11"
- b - "b" size - 11" x 17"
- c - "c" size - 17" x 22"

A Model 1030-1N has β -c-1030-1N-1. A Model 1010-30R-M2-V2 has β -b-1010-30R-M2-V2-2, etc.

- 1: β -c-1000-1, a schematic circuit diagram of the entire power supply. The power and high voltage dc circuits are indicated with heavy lines. Electrical specifications for the particular power supply are tabulated thereon.
- 2: β -b-1000-2, showing parts placement on the control panel and chassis, and in the high voltage section. Mechanical specifications of the particular power supply are tabulated thereon.
- 3: β -c-1000-3, a schematic wiring diagram of the entire power supply. This is a point-to-point wiring diagram, indicating that all wires are number coded for ease of trouble shooting and component isolation, except in the high voltage section, or for short jumpers, readily traced, in the control section.

- 4: 8-a-1000-4, a calibration curve of the no load output voltage vs. the HIGH VOLTAGE CONTROL setting.
- 5: 8-a-1000-5, a calibration curve of the OVERLOAD TRIP CONTROL setting vs. the current at which the overload relay will pull in (-OL designs only).
- 6: 8-a-1000-6, a calibration curve of the OVERVOLTAGE TRIP CONTROL setting vs. the current at which the overvoltage relay will pull in (-OV designs only).

OPERATING PROCEDURE - OIL FILLED UNITS

- 1: Loosen the bolts on top of the tank edge, remove tank from chassis and then remove the high voltage components from the tank. Be sure to loosen all support brackets.
- 2: Check continuity of the high voltage transformer's secondary.
- 3: Check continuity of the high voltage interconnecting wires.
- 4: Remove the tape that binds the output shorting mechanism's plunger, and also remove any tape used to secure anti-corona nuts during shipment.
- 5: Check the values of the various high voltage resistors. Refer to drawing 8-b-1000-3 for the components' values, corresponding to the parts' layout of drawing 8-b-1000-2.
- 6: Screw the output cable into place.
- 7: (-R designs only): Set the polarity reversing jacks to correspond to high voltage positive or negative, as desired. Refer to drawing 8-b-1000-2 for reversing scheme.
- 8: Fill the tank with clean-dehydrated transformer oil, of at least 25 kv test, to the level indicated by the line stamped on the tank, about 2" from the tank top, before immersing the high voltage components into the tank.
- 9: Lower the high voltage components slowly into the oil, to minimize splashing and aeration.
- 10: Bolt the cover back, using a small hand wrench. Place angle brackets under bolts on left edge of tank lid, as viewed from rear, bolt tank to chassis along top left and lower right sides.
- 11: Connect the control section to the tank by means of the interconnecting plug.
- 12: Return to page 12, B; ELECTRICAL for Electrical Operating Instructions.

PARTS LIST

SERIES 1000 POWER SUPPLIES

Beta Electric Corporation

THE FOLLOWING IS AN EXCERPT FROM 16B16 (RE) 1 JULY 1946, THE BUREAU OF SHIPS INTERIM SPECIFICATION FOR INSTRUCTION BOOKS FOR ELECTRONIC EQUIPMENT, par. Eli:

STANDARD COMPONENT DESIGNATIONS

<u>SYMBOL</u>	<u>DEFINITION</u>
A	Structural parts, panels, frames, castings, etc.
B	Motors and prime movers, self-synchronous motors, etc.
C	Capacitors of all types.
D	Dynamotors, rotary converters.
E	Miscellaneous electrical parts; insulators, knobs, brushes, antennas, etc.
F	Fuses
G	Generators, exciters, etc.
H	Hardware, screws, bolts, studs, pins, etc.
I	Indicating devices, (except meters and thermometers), pilot lamps, etc.
J	Jacks and receptacles (fixed connectors, male or female.)
K	Contactors, relays.
L	Inductors, r.f. and a.f.
M	Meters of all types, gauges, thermometers, etc.
O	Mechanical parts; bearings, shafts, couplings, gears, etc.
P	Plugs (movable connectors, male or female).
Q	Diaphragms (microphone, telephone, projector, etc.).
R	Resistors, fixed and variable, potentiometers, attenuators, etc.
S	Switches, interlocks, thermostats, thermo-regulators.
T	Transformers, r.f., a.f. and power.
U	Hydraulic parts.
V	Vacuum and gaseous discharge tubes.
W	Wires, interconnecting cables, etc., wave guides, transmission lines, delay lines, shield wires.
X	Sockets (electron tubes, pilot lamps, fuses, etc.)*
Y	Mechanical oscillators, crystals, magnetostriction tubes, etc.
Z	Filters, i-f transformers, compound tuned circuit assemblies, etc., in a common container.
BT	Batteries
CR	Rectifiers (electrochemical, copper oxide, selenium, crystal, etc., except vacuum or gaseous tubes).
HS	Handset (telephone and microphone combination).
HR	Heater.
HT	Head telephones.
HX	Heat exchangers.
LS	Loudspeakers.
MG	Motor generators (single unit).
MI	Microphones (hand or chest set type).
TB	Terminal boards.
TY	Surge eliminators (special discharge resistors).
VR	Voltage regulators (except vacuum or gaseous tubes).

* The symbol designation for sockets shall bear the same basic number as for the associated component. To accomplish this, the appropriate symbol letter shall be prefixed with the letter "X", e.g. use "XV" for tube sockets, "XI" for pilot lamps, sockets, etc.

Parts List *
Series 1000 Power Supplies

- 1 -

Part No.	Component	Beta Code No.	Description	Location	Function
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According to panel height, the panel is punched per the following drawings:

A1 (β)	Panel	22A	β-c-22A-1000-8 3/4.	(The group of numbers and	Mounting panel for controls and meters, in relay rack designs.
	Panel	22A	β-c-22A-1000-10 1/2.	(fractions after the -1000-	
	Panel	22A	β-c-22A-1000-12 1/4.	(represent the panel height.	
	Panel	22A	β-c-22A-1000-14.	(Example: β-c-22A-1000-12 1/4 =	
	Panel	22A	β-c-22A-1000-15 3/4.	(12 1/4" high panel, 19" wide,)	
	Panel	22A	β-c-22A-1000-17 1/2.	(1/8" steel; gray hammertone.)	
	Panel	22A	β-c-22A-1000-19 1/4.		
	Panel	22A	β-c-22A-1000-21.		

Panel for portable supplies.

A2

NOT USED

A3 (β)

Chassis	11A	β-c-11A-1000-8 3/4.	(The group of numbers and)
Chassis	11A	β-c-11A-1000-10 1/2.	(fractions after the -1000-)
Chassis	11A	β-c-11A-1000-12 1/4.	(represents the height of)
Chassis	11A	β-c-11A-1000-14.	(the panel with which)
Chassis	11A	β-c-11A-1000-15 3/4.	(the respective chassis is)
Chassis	11A	β-c-11A-1000-17 1/2.	(generally used.)
Chassis	11A	β-c-11A-1000-17 1/2A.	
Chassis	11A	β-c-11A-1000-19 1/4.	
Chassis	11A	β-c-11A-1000-21.	

Mounts high voltage components, input receptacles, ground post, etc.

A4 (β)

" Cover	13A	β-13A-1000-8 3/4.	(The group of numbers and)
" Cover	13A	β-13A-1000-10 1/2.	(fractions after the -1000-)
" Cover	13A	β-13A-1000-12 1/4	(represents the height of)
" Cover	13A	β-13A-1000-14.	(the panel with which the)
" Cover	13A	β-13A-1000-15 3/4.	(respectively cover is gen-)
" Cover	13A	β-13A-1000-17 1/2.	(erally used.)
" Cover	13A	β-13A-1000-19 1/4.	
" Cover	13A	β-13A-1000-21.	

Encloses chassis & panel components (Safety shield cover).

* NOTE: Not all components listed herewith are included with each power supply. The detailed wiring diagram β-c-1000-3 shows all circuit components that ARE USED. Mechanical components must be determined from the description in the parts list.

Parts List *
Series 1000 Power Supplies

Beta Electric Corp.

-2-

Part No.	Component	Beta Code No.	Description	Location	Function
A5		NOT USED			
A6	Lucite	52A	Lucite rod, fabricated per dwg. β -c-52A-1000-2.	Chassis	Insulated supports for selenium rectifier.
	Lucite	52A	As above, β -c-52A-1000-3.		
	Lucite	52A	As above, β -c-52A-1000-4.		
	Lucite	52A	As above, β -c-52A-1000-6.		
	Lucite	52A	As above, β -c-52A-1000-8.		
A7	Lucite	52A	Lucite rod fabricated per dwg. β -a-52A-1000-A.		Insulated post for output shorting mechanism.
A8	Tank & cover	30A	(steel) per dwg. β -d-30A-3040-60. (or aluminum).	Chassis	Houses high voltage section.
A9-11	Angles		Per dwg. β -a-58A-1040-2R-E.	Chassis	Mounts high voltage section.
C1	Capacitor		See wiring dwg. β -c-1000-3 for specifications.	Chassis	Filter for high voltage.
C2	Capacitor		See wiring dwg. β -c-1000-3 for specs.	Chassis	Filter for high voltage.
C3, 4 (β)	Capacitor	7C	0.01 mfd, 400V dc, Micamold #339BE110.	Chassis	RF noise suppressors.
C5	Capacitor		See wiring dwg. β -c-1000-3 for specs.	Panel	Filter and bypass for peak currents on K3 and M2.
C6	Capacitor		See wiring dwg. β -c-1000-3 for specs.	Chassis	Additional filtering for L1, or L2 or L3 feature.
E1 (β)	Pushbutton	407EB	Pushbutton for Arrow-Hart and Hegeman pushbutton switch 3392A; ICA #1282. BLACK*	Panel	High voltage ON pushbutton switch cap.
E2 (β)	Pushbutton	407ER	Per above, RED.	Panel	High voltage OFF pushbutton switch cap.

* Arrow Hart & Hegeman #3391-194.

Parts List *
Series 1000 Power Supplies

-3-

Beta Electric Corp.

Part No.	Component	Beta Code No.	Description	Location	Function
E3 (β)	Bushing	300E	Nylon strain relief bushing, Heyman Mfg. Co. #SR-7P.	Chassis	Output cable chassis bushing.
E4	Shield	4E	Rubber shield, Mueller #29, for Mueller #27 battery clip.	Cable	Insulator for output connector.
E5	Knob	403E	Knob, ICA #1274S.	Panel	Adjustment control knob for -F feature.
E6	Knob	403E	Knob ICA #1274S.	Panel	Adjustment control knob for -M feature.
E7	Knob	403E	Knob ICA #1274S.	Panel	Adjustment control knob for -OL feature.
E8	Knob	403E	Knob ICA #1274S.	Panel	Adjustment control knob for -R feature.
E9	Knob	403E	Knob ICA #1274S.	Panel	Adjustment control knob for -V feature.
E10-21 E90	Lucite		Per dwg. β-c-30A-3040-60-E1. Per β-a-40E	Chassis "	Mounts components, provides insulation. → Over voltage protection signal
F1,2 (β)	Fuse	1F	Extractor post cartridge fuse, quick acting type. 250V ac rating. Littelfuse type 3AG or Bussman type AGC, or equivalent; See wiring diagram β-c-1000-3 for rating.	Panel	Main fuses.
	Fuse	OR 2F	Extractor post cartridge fuse, quick acting type. 250V ac rating. Littelfuse type 3AB or Bussman type ABC, or equivalent; See wiring diagram β-c-1000-3 for rating.		
F3 (β)	Fuse	1F	See code #1F above.	Panel	High voltage transformer input fuse.
	Fuse	OR 2F	See code #2F above.		
H1,2 (β)	Handle	77H	Metal carrying handle; 4-1/2", Precision Metal Products #2102, with mating end ferrule #2105.	Panel	Handles.
H3,4 H5	Handle Bracket	76H 55H	Black or gray handle, Stanley #482J, #2. Component mounting bracket, per dwg. β-a-55H-1000-1.	Panel Panel	Handles. Mounts meter calibrating pots, R11 and R14.
H6	Bracket	55H	Per above, dwg. β-a-55H-1000-2.	Panel	Mounts overload calibrating pots.

Part No.	Component	Beta Code No.	Description	Location	Function
~~H7 (β)~~	~~Bracket~~	~~55H~~	~~Per H5, dwg. β-a-55H-1000-3.~~	~~Panel~~	~~Mounts solenoid and microswitch.~~
H8	Bracket	55H	Per H5, dwg. β-a-55H-1000-4.	Panel	Mounts calibrating pots on range switch. R11 to R13 and R14 to R16.
H9a, b, (β)	Bracket	55H	Per H5, dwg. β-a-55H-1000-5.	Panel	Mounts terminal strips to panel. (TB1 and TB2).
H10			NOT USED		
H11 (β)	Bracket	55H	Actuating bracket, β-a-55H-1000-7.	Solenoid	Actuates HV on LOCKING micro-switch.
H12-14	Tube clamp	43H	Birtcher #926A.	Panel	Secures gas tubes.
H15 (β)	Bracket	55H	Bracket, β-a-55H-1000-6.	Bracket H15	Mounts relays and VR tubes.
I1 (β)	Lamp	II	Neon glow lamp, 117V (nominal), 1/25W miniature bayonet base; NE-51, T-3-1/4 bulb. (Requires external resistor.)	Panel	Indicates main fuse blown.
I2 (β)	Lamp	II	As above.	Panel	Indicates main fuse blown.
I3 (β)	Lamp	II	As above.	Panel	Indicates external interlock open.
I4 (β)	Lamp	II	As above.	Panel	Indicates overload trip operated.
I5 (β)	Lamp	II	As above.	Panel	Indicates high voltage is on.
I6 (β)	Lamp	II	As above.	Panel	Indicates H. V. transformer input fuse open.
I7 (β)	Lamp	II	As above.	Panel	Indicates filaments on.
* J5,6					<i>Polarity Reversal</i>
J1 (β)	Receptacle	100J	Power, Amphenol 61-M10 (male); 2 pole, standard plug, recessed male receptacle; 110V, 15A, /250V, 10A.	Chassis	AC power input (as labelled).
J2 (β)	Receptacle	101J	Power, Amphenol 61-F1 (female); 2 pole, standard flush female receptacle; 110V, 15A, /250V, 10A.	Chassis	Aux. 115 volts ac outlet.
J3 (β)	Receptacle	101J	Per above.	Chassis	External interlock connector.
J4 (β)	Binding post	105J	Single connector, all metal; labelled "ground" ICA type 631 or equivalent.	Chassis	External ground connection.
* J5, 6	Jack	51J	Banana; Birnbach #403 (medium); mates with 1P; (Birnbach #401).	Chassis	Polarity reversal.
J7	Receptacle	1J	1 contact; 97-3102-24-835S; mates with 1P. Chassis (97-3106-24-835P.)	Chassis	High voltage output connector.
J8	Receptacle	6J	12 contact; AN 3102-28-8P.	Chassis	Control-H. V. S. interconnector.
J9	Jack	51J	Banana; Birnbach #401.	Chassis	Control-H. V. S. jack.

Parts List *

Series 1000 Power Supplies

Beta Electric Corp.

-5-

Part No.	Component	Beta Code No.	Description	Location	Function
K1 (β)	Relay	24K	115V ac coil; DP-DT, 5A, 115V ac contacts; Potter and Brumfield KR11A.	Bracket H-15	Overload holding relay.
K2 (β)	Solenoid	26K	115V ac, 60 cycle coil; Soreng #6G 12100A. Panel		Hold-On relay and output shorting.
K3	Relay	12K	1 1/2 ma dc; 12k ohm coil; SPDT, 110V ac contacts; Kurman type BK35.	Bracket H-15	Overload relay.
	Relay	OR 7K	1.5 milliamperes dc, 2200 ohm coil, SPDT, 5A, 115 volt ac contacts; Advance type 1200.		
	Relay	OR 27K	Sensitrol relay, 5 microampere sensitivity; single magnetic contact with 120 V ac solenoid reset; Weston Model 813.		
K4	Relay	5K	115 V ac coil; SP-DT, 10A; 115V ac contacts; Leach type 1127 or equivalent.	Panel	High voltage on relay. <i>and isolation</i>
K5	Relay	25K	Haydon time delay relay, 0-57 second adjustable; 125V ac, 15A contact rating, 115V, 60 cycles coil; Haydon #5901-2.	Panel	Time delay relay.
K6	Relay	12K	1 1/2 ma dc; 12,000 ohm coil; SP-DT, 110V ac contacts; Kurman type BK35.		Overvoltage relay.
	Relay	OR 27K	Sensitrol relay, 5 microampere sensitivity; single magnetic contact with 120 V ac solenoid reset; Weston Model 813.		
K7	Timer		3 minute time delay timer, 115 V, 60 cycles. Industrial Timer Corp. Model TD3M.		High voltage on timer (-HT feature)
K8	Relay	26K	Per K2 above.	Chassis	Output shorting solenoid.
M1 (β)	Meter	2M	DC microammeter; 50 ua full scale; 3" square bakelite case; Simpson Model 27; see wiring dwg. β-c-1000-3 for labelling.	Panel	Kilovoltmeter.
M2 (β)	Meter	2M	Per above.	Panel	Milliammeter (except for -CT designs in which case, this meter is a kv-meter.)
P1,2	Tube cap	102P	National #SPP-9 steatite.		Tube cap.
P3	Clip	105P	Battery; Mueller #27.	Chassis Cable	Output connector.

Parts List *
Series 1000 Power Supplies

-6-

Beta Electric Corp.

Part No.	Component	Beta Code No.	Description	Location	Function
P5, 6	Plug	51P	Banana; Birnbach #401; mates with 51J.	Chassis	Polarity reversal.
P7	Connector	1P	1 contact; 3106-24-835P; mates with 1J.	Cable	Output cable connector.
P8	Connector	6P	12 contact; 97-3106-28-8S.	Cable	Mates with J8.
P9	Plug	51P	Banana; Birnbach #401.	Cable	Mates with J9.
R1, 2 (β)	Resistor	1R	100k ohm, 1 watt carbon, 10% tolerance,	Panel	Neon light return current path.
R3 (β)	Resistor		See dwg. β-c-1000-3 for value.	Chassis	Short circuit current limiter.
R4 (β)	Resistor	4R	RPC, see dwg. β-c-1000-3 for value.	Chassis	Kilovoltmeter multiplier.
R5 (β)	Resistor	4R	See dwg. β-c-1000-3 for value.	Chassis	Shorting mechanism and overvoltage spark gap surge suppressor.
R6 (β)	Resistor	2R	1/2W, precision, composition, 5% tolerance; C-N type X-1/2. See dwg. β-c-1000-3 for value.	Panel	Fires V3 at excessive M1 current.
R7 (β)	Resistor	2R	Per R6, see dwg. β-c-1000-3 for value.	Panel	Fires V5 at excessive M2 current.
R8	Potentiometer	3R	Pot; standard linear; wire wound or carbon; see dwg. β-c-1000-3 for value.	Panel	Fine output voltage control.
R9 (β)	Resistor	1R	See dwg. β-c-1000-3 for value.	Panel	Coarse calibrator for overload relay.
R10 (β)	Resistor	10R	100k ohms, 4W, WW pot,	Panel	Fine overload calibrator (K3).
R11 (β)	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calibrator for highest voltage range of M1.
R12	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calib. for next lower voltage range of M1.
R13	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calib. for lowest voltage range of M1.
R14 (β)	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calibrator for highest current range of M2.
R15	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calib. for next lower current range of M2.
R16	Pot		See wiring dwg. β-c-1000-3 for specs.	Panel	Calib. for lowest current range of M2.
R17 (β)	Resistor	6R	5k ohm, 5W, WW resistor.	Panel	Prevents residual sticking of solenoid.
R18	Resistor		See wiring dwg. β-c-1000-3 for specs.	Panel	Coarse calibration for milli-ammeter (in high current power supplies).

Parts List *

Series 1000 Power Supplies

-7-

Beta Electric Corp.

Part No.	Component	Beta Code No.	Description	Location	Function
R19	Resistor		See wiring dwg. β -c-1000-3 for specifications.		Overvoltage relay coarse calibrator fixed resistor.
R20	Pot		See wiring dwg. β -c-1000-3 for specs.		Overvoltage relay coarse calibrator.
R21	Pot		See wiring dwg. β -c-1000-3 for specs.		Overvoltage relay fine calib.
S1 (β)	Switch	5S	Momentary pushbutton switch, 2 circuits; 1-NO 1-NC, BREAK BEFORE MAKE; 3A at 125 V ac contacts with screw terminals; Arrow-Hart & Hegeman #3392A or equivalent.	Panel	HIGH VOLTAGE OFF and OVERLOAD RESET switch.
S2 (β)	Switch	5S	As above.	Panel	HIGH VOLTAGE ON switch.
S3	Switch	2S	Spring leaf switch, SP-DT, 15A, 115V ac contacts; Microswitch type BZ-2RL-A2.	Panel	Zero start interlock (-Z feature).
~~S4 (β)~~	Switch		Spring leaf switch; with roller; per above; Microswitch type BZ-2RL-2.	Panel	Holding switch-HIGH VOLTAGE ON.
S5	Switch	8S	Rotary selector switch; 4 poles; 2-5 positions; shorting; steatite insulation; Centralab #2514.	Panel	Meter polarity selector (-R feature).
S6 (β)	Switch	4S	Toggle switch; DP-ST; 12A, 125V ac contacts; Arrow-Hart & Hegeman 80600 or equivalent.	Panel	As labelled.

Part No.	Component	Beta Code No.	Description	Location	Function
S7	Switch	7S	Rotary selector switch; 2 poles, 2-5 positions shorting; steatite insulation; Centralab #2504.	Panel	Meter range selector (V2, V3 feature).
S8	Switch	7S	As above.	Panel	Meter range selector (M2, M3 feature).
S9	Switch	5S	Momentary pushbutton switch, 2 circuits, 1-NO, 1-NC; BREAK BEFORE MAKE; 3A at 125V ac contacts with screw terminals; Arrow-Hart & Hegeman #3392A or equivalent.	Panel	Bypass for zero start interlock, (-NZb feature).
T1 (β)	Covat		See wiring dwg. β -c-1000-3 for specifications.	Panel	Coarse high voltage control.
T2 (β)	Transformer		See wiring dwg. β -c-1000-3 for specifications.	Chassis	High voltage transformer.
T3	Transformer 200T		Pri: 105/115V, 50/60 cycles; Sec: 2.5 V CT at 10A, 1500 V insulation; UTC #S-53 or equivalent.	Chassis	Fine injection voltage transformer.
T4	Transformer		See wiring dwg. β -c-1000-3 for specifications.	Chassis	Filament transformer.
T5	Transformer		Per above, (not always used).	Chassis	Filament transformer.
T6	Transformer		Per above.	Chassis	Filament transformer for V6, (used in high current designs).
T7	Transformer		See wiring dwg. β -c-1000-3 for specifications.		220-110 V transformer.
V1	Rectifier		See wiring dwg. β -c-1000-3 for specifications.	Chassis	High voltage rectifier.
V2	Rectifier		See wiring dwg. β -c-1000-3 for specifications.	Chassis	High voltage rectifier.
V3 (β)	Gas tube		VR75 (OA3)		Surge protector.
V4	Gas tube		Per above.		Surge protector.
V5	Gas tube		Per above.		Surge protector.
V6	Gas tube		See wiring dwg. β -c-1000-3 for specifications.	Chassis	Surge protector for M2 on high current designs.
V7, 8	Rectifier		Per V1.	Chassis	High voltage rectifier. (Full-wave bridge).

Parts List *

Series 1000 Power Supplies

-9-

Beta Electric Corp.

Part No.	Component	Beta Code No.	Description	Location	Function
W1	Cable		RG 8/U coaxial cable, eight feet.	Chassis	Output cable.
XF1, 2(β)	Fuse holder	1XF	Bussman type NKP fuse assembly, or equivalent (15A or less rating).	Panel	Main fuse holders.
XF3 (β)	Fuse holder	1XF	As above.	Panel	High voltage xfmr. input fuse.
XII.12(β)	Pilot light holder	1XI	Dialco type 811308-437 assembly; clear faceted lens; with built-in resistor.	Panel	Main fuse pilot light holders.
X13 (β)	As above	1XI	As above.	Panel	External interlock indicator pilot light holder.
X14 (β)	As above	1XI	As above.	Panel	High voltage off pilot light holder.
X15 (β)	As above	1XI	As above.	Panel	High voltage on pilot light holder.
X16 (β)	As above	1XI	As above.	Panel	High voltage transformer input fuse pilot light holder.
X17 (β)	As above	1XI	As above.	Panel	Filament and control power pilot light holder.
XV1, 2	Tube socket		See wiring diagram β-c-1000-3 for specs.	Chassis	High voltage rectifier sockets.
XV3-5	Tube socket	2XV	Octal tube socket, bakelite dielectric, Amphenol #77-MIP-8 or equivalent.	Bracket H-15	Surge protector sockets.
CR1	Selenium rectifier		See wiring dwg. β-c-1000-3 for specifications.	Chassis	High voltage rectifier.
CR2	Selenium rectifier		See wiring dwg. β-c-1000-3 for specifications.	Chassis	High voltage rectifier.
TB1, 2(β)	Terminal board	1TB5	Jones barrier strips, Cinch Jones Series 141. (five terminals).		Termination for metering components

Parts List *

Series 1000 Power Supplies

- 10 -

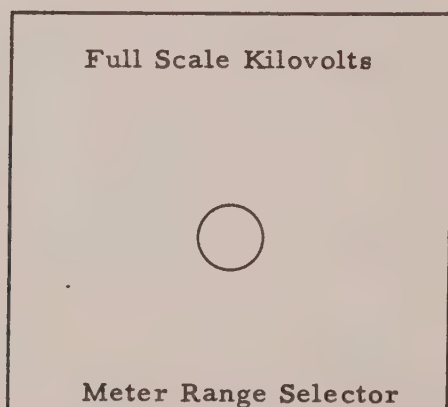
Beta Electric Corp.

Part No.	Component	Beta Code No.	Description	Location	Function
TB3	Terminal board	1TB	Jones barrier strips; Cinch Jones Series 141. See wiring dwg. β -c-1000-3 for specifications.		Termination for high voltage transformer primary.
TB4	Terminal board	1TB	Jones barrier strips; Cinch Jones Series 141. See wiring dwg. β -c-1000-3 for number of terminals.		Termination for filament transformer primary.
TB5		4TB	<i>Precision Metal Products #2604 Term. Board</i>	<i>VR. Table</i>	<i>Mounts components</i>
TB10			<i>Cinch Jones Term. Strip #3-140 Y</i>	<i>Graclet on Panel</i>	<i>Interconnection for filter sections when used.</i>
VR1	Voltage regulator		See wiring dwg. β -c-1000-3 for specifications.	Panel	Input supply voltage regulator (-C1, C2 features.)

(β) indicates use of component in all 1000 Series power supplies

Part No.	Description	Location
NP1 (β)	ALWAYS OPERATE WITH GOOD EXTERNAL GROUND	Chassis
NP2 (β)	AUX. 115 VOLT AC OUTLET	Chassis
NP3	CONTROL AND FILAMENT POWER	Panel
NP4 (β)	EXTERNAL INTERLOCK OPEN	Panel
NP5 (β)	FOR EXTERNAL INTERLOCK	Chassis
NP6	HIGH VOLTAGE CONTROL	Panel
NP7 (β)	HIGH VOLTAGE ON	Panel
NP8 (β)	HIGH VOLTAGE TRANSFORMER INPUT FUSE BLOWN	Panel
NP9 (β)	MAIN FUSES	Panel
NP10 (β)	115 V AC INPUT	Chassis
NP11 (β)	BETA ELECTRIC CORP MODEL # SERIAL #	Chassis
NP12 (β)	DANGER H. V. (small aluminum)	Safety shield cover
NP13	COARSE HIGH VOLTAGE CONTROL	Panel
NP14	FINE HIGH VOLTAGE CONTROL	Panel
NP15	HIGH VOLTAGE OFF OVERLOAD RESET	Panel
NP16 (β)	HIGH VOLTAGE OUTPUT	Chassis
NP17	METER POLARITY SELECTOR +	Panel
NP18	NEGATIVE HIGH VOLTAGE POLARITY (POSITIVE GROUNDED)	Panel
OR	POSITIVE HIGH VOLTAGE POLARITY (NEGATIVE GROUNDED)	Panel
OR	REVERSIBLE HIGH VOLTAGE POLARITY (LOW TERMINAL GROUNDED)	Panel
NP19	OVERLOAD TRIP CONTROL	Panel
NP20	SET HIGH VOLTAGE CONTROL TO ZERO	Panel

Part No.	Description	Location
NP21	WAIT 30 SECONDS BEFORE APPLYING HIGH VOLTAGE	Panel
NP22 (β)	βETA ELECTRIC CORP. HIGH VOLTAGE D. C. POWER SUPPLY	Panel
NP23	CONTROL 0-10, Mallory #395.	Panel
NP24	CONTROL POWER	Panel
NP25	POSITIVE OUTPUT	Chassis
NP26	NEGATIVE OUTPUT	Chassis
NP27	FULL SCALE KILOVOLTS METER RANGE SELECTOR	Panel



NP28	FULL SCALE MILLIAMPERES METER RANGE SELECTOR	Panel
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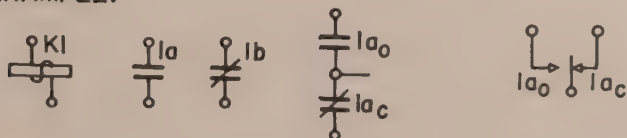
C		CAPACITOR
E		SPARK GAP
E		STANDOFF INSULATOR
F		FUSE
I		NEON GLOW LAMP
I		INCANDESCENT LAMP
J		2-POLE MALE RECEPTACLE
J		2-POLE FEMALE RECEPTACLE
J		3-POLE MALE RECEPTACLE
J		BANANA JACK ; BINDING POST

J		"AN" RECEPTACLE
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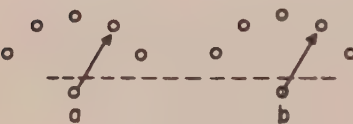
J		PHONE JACK
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K		RELAY		NORMALLY OPEN CONTACTS		SINGLE POLE DOUBLE THROW CONTACTS
				NORMALLY CLOSED CONTACTS		

EXAMPLE:

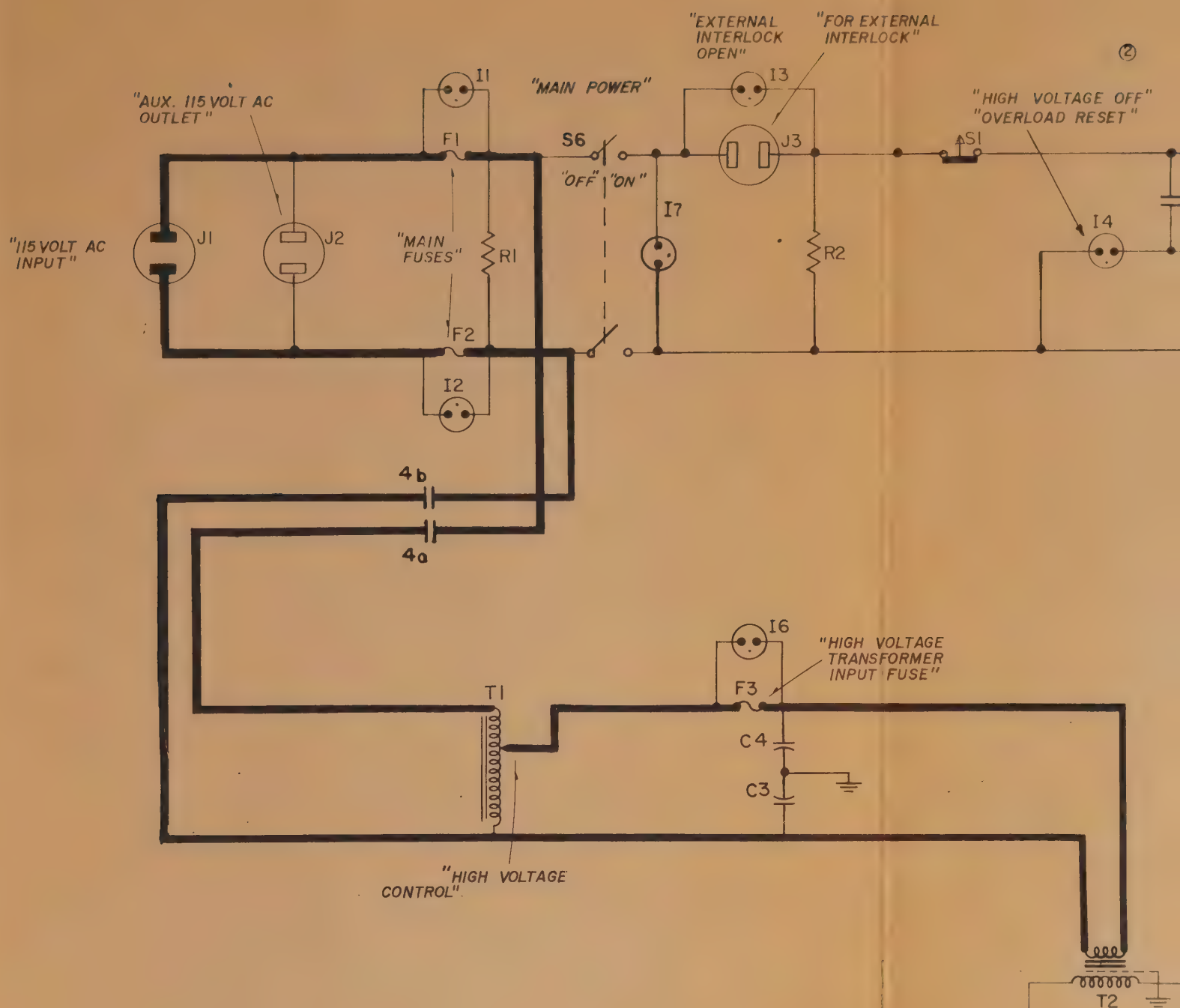


K		SOLENOID RELAY
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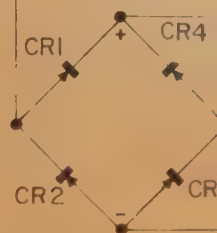
L		FILTER CHOKE
M		METER
P		BANANA PLUG
R		RESISTOR
R		POTENTIOMETER, RHEOSTAT
S		PUSHBUTTON SWITCH, NORMALLY CLOSED
S		PUSHBUTTON SWITCH, NORMALLY OPEN
S		TOGGLE SWITCH, MICRO - SWITCH, ETC., ROTARY SNAP SWITCH, ETC.,
S		ROTARY SELECTOR SWITCH, GANGED
T		TRANSFORMER
		COVAT
T		AUTO TRANSFORMER
W		INDICATES SHIELDED WIRE
W		WIRING TERMINAL
W		PHYSICAL CONNECTION (SOLDER, ETC.)

NOTE:

MANY SELF-EXPLANATORY SYMBOLS SUCH AS RECTIFIERS, AMPLIFIER TUBES, ETC., ARE NOT INCLUDED HEREIN.

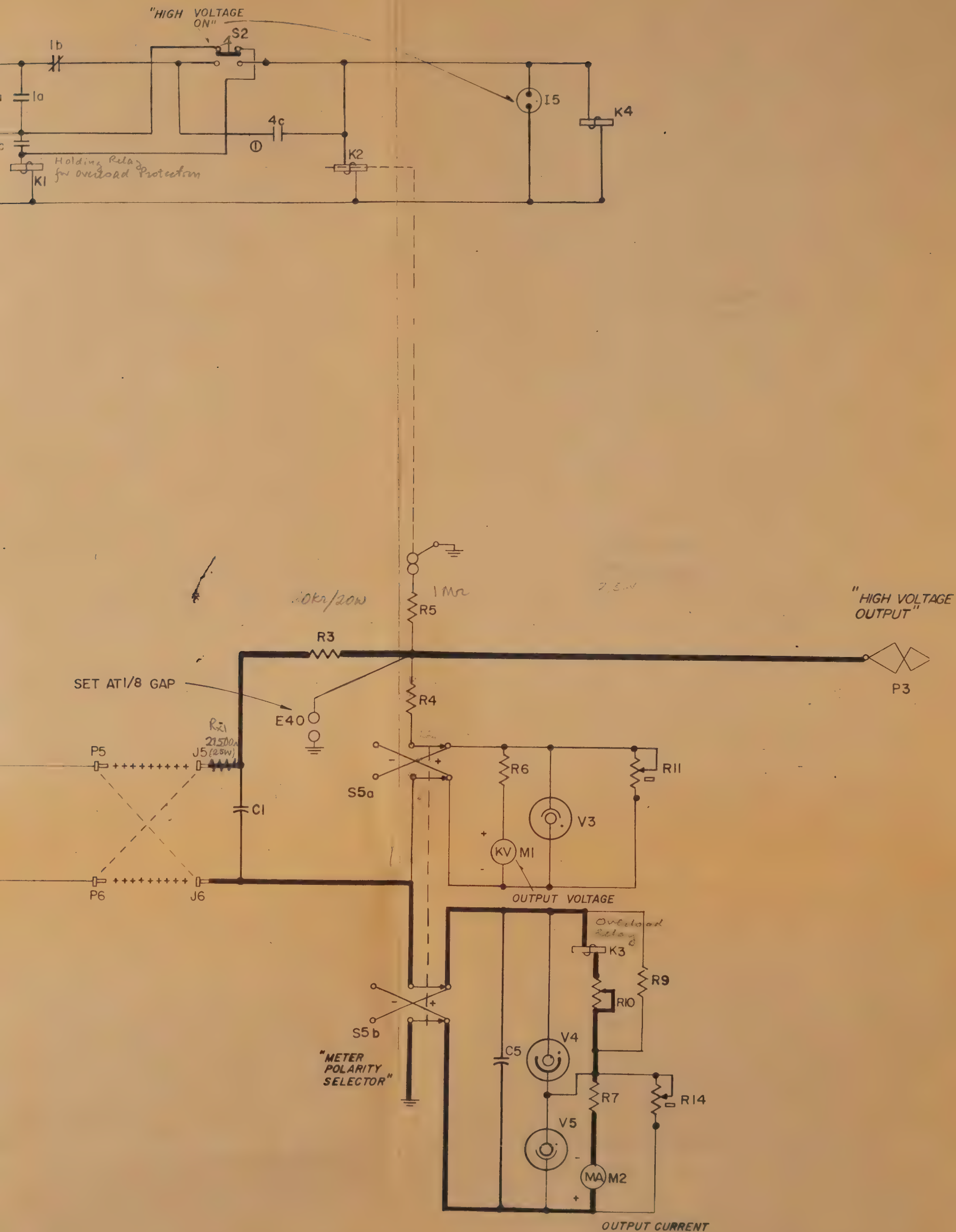


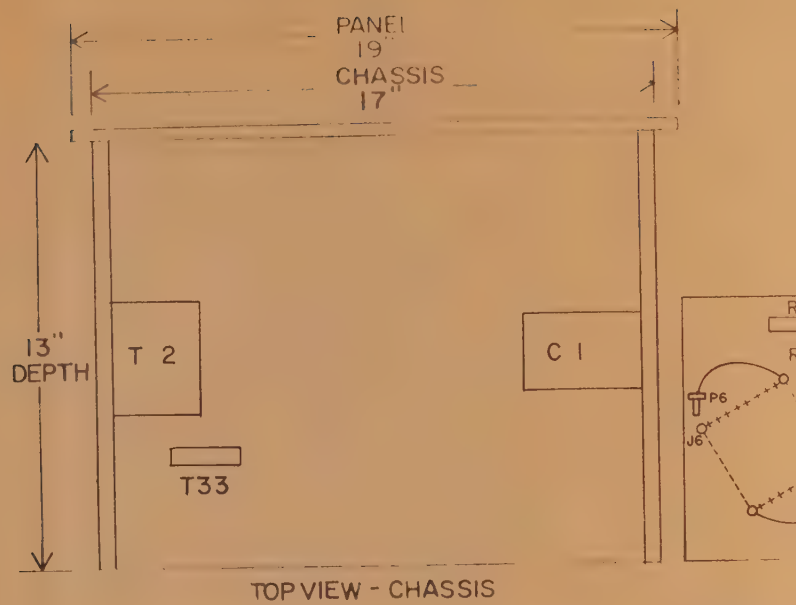
J4 "ALWAYS OPERATE WITH GOOD EXTERNAL GROUND"



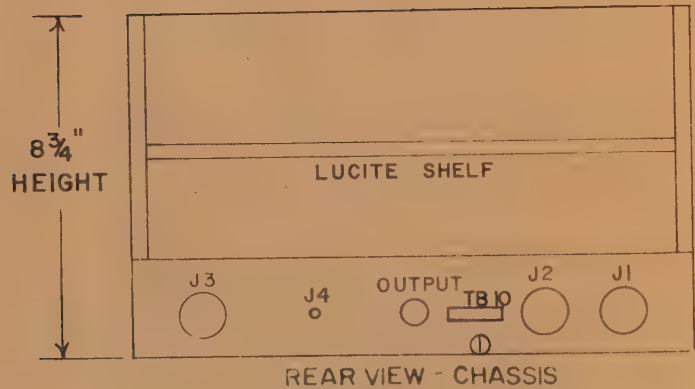
ELECTRICAL SPECIFICATIONS	
INPUT VOLTAGE	117 V, 60~
INPUT VOLTAMPERES	223
OUTPUT VOLTAGE (RATED)	5 KV
OUTPUT CURRENT (RATED)	10 MA
POLARITY	REVERSIBLE
RIPPLE (AT RATED OUTPUT CURRENT & VOLTAGE)	.2 %
REGULATION (LOAD)	34 %

POT WITH MECHANICAL STOP SET FOR MINIMUM RESISTANCE APPROXIMATELY 10% OF MAXIMUM



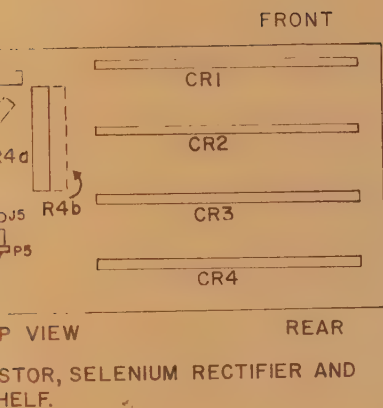


LUCITE R
REVERSING



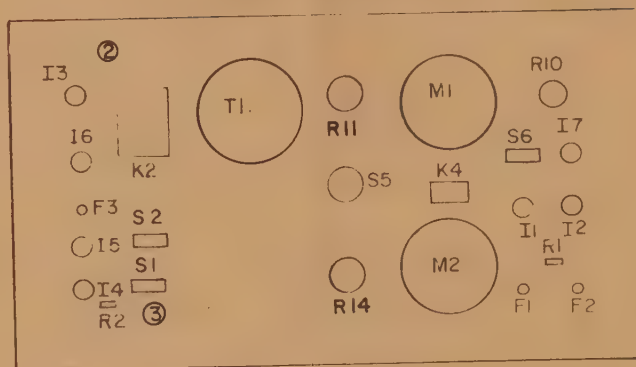
MECHANICAL SPECIFICATIONS		
WIDTH	PANEL	19"
	CHASSIS	17"
DEPTH		13"
FINISH		GRAY HAMMERTONE
HEIGHT		8 3/4"
WEIGHT		45lbs.

NO.
①
②
③

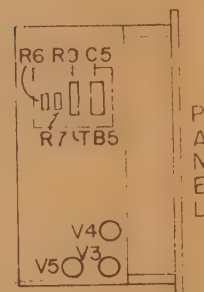
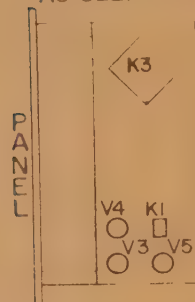


STOR, SELENIUM RECTIFIER AND
HELF.

PANEL REAR VIEW

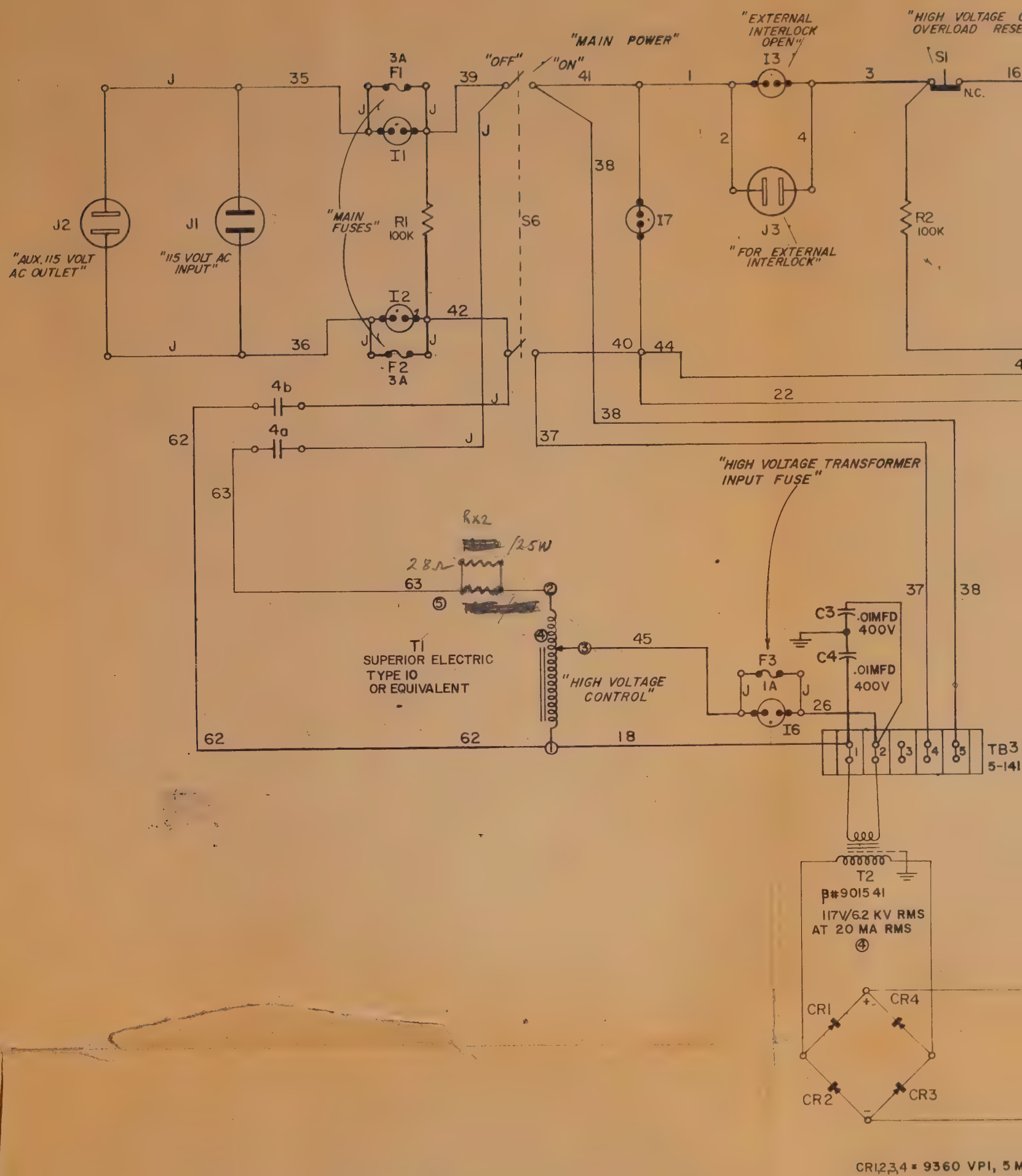


BRACKET
LEFT SIDE
AS SEEN FROM REAR



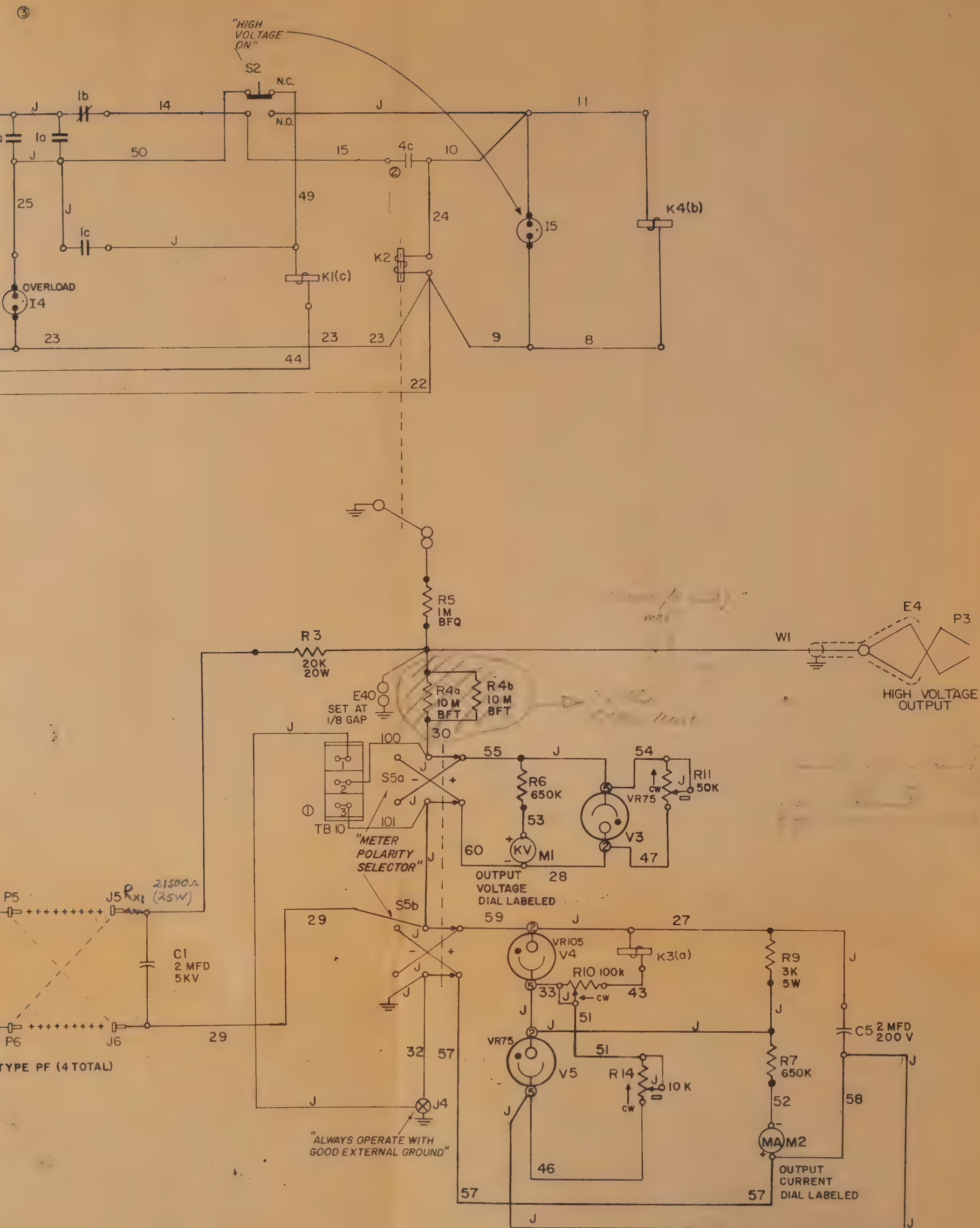
BRACKET
RIGHT SIDE
AS SEEN FROM REAR

REVISION	BY	DATE	PARTS PLACEMENT	
NO ADDED	SE	5/13/57	DIMENSIONS IN INCHES DO NOT SCALE	BETA ELECTRIC CORP. NEW YORK 29, N. Y.
MOVED S4	SE	5/13/57		
REMOVED	HC	8-1-57	DRAWN BY SE 10/31/56	1005-10R-2
			CHECKED BY HC 3/1/57	
			APPRO'D BY	



NOTES:

• POT WITH MECHANICAL STOP SET FOR MINIMUM RESISTANCE;
APPROXIMATELY 10% OF MAXIMUM.



NO.	REVISION	BY	DATE	SCHEMATIC WIRING DIAGRAM	
①	ADDED TB 10 AND WIRES 100 & 101	SE	5/13/57	DIMENSIONS IN INCHES DO NOT SCALE	
②	REMOVED S4; ADDED CONTACT 4c	SE	5/13/57		
③	R17 REMOVED	HC	8-1-57	DRAWN BY SE 10/31/56	
④	T2 CHANGED FROM 901041	HC	10/8/57		
⑤	WIRE #63 REMOVED FROM PIN #4 OF T1	HC	10/8/57	CHECKED BY <i>HC</i> 3/1/57	
				APPR'D BY	
				BETA ELECTRIC CORP. NEW YORK 29, N. Y.	
				1005-10R-3	

CALIBRATION CURVE

OUTPUT VOLTAGE AT NO LOAD
VS.

HIGH VOLTAGE CONTROL SETTING

Beta Electric Corp.
NEW YORK 29, N.Y.

β 1005-10R-4
1005-10R80-4

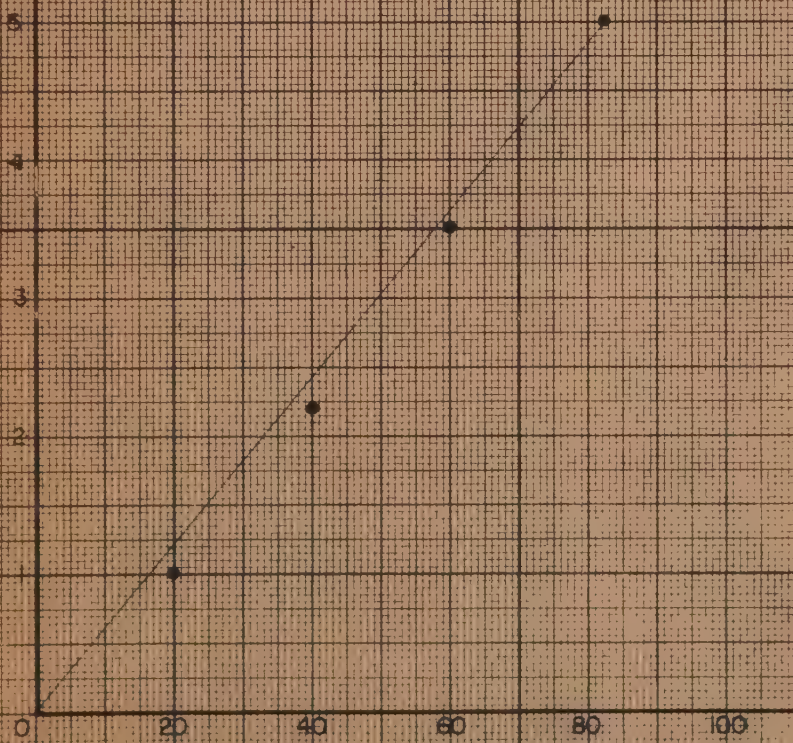
DR. BY FR 2-28-57

CKD BY *HK* 3-1-57

APPEL BY

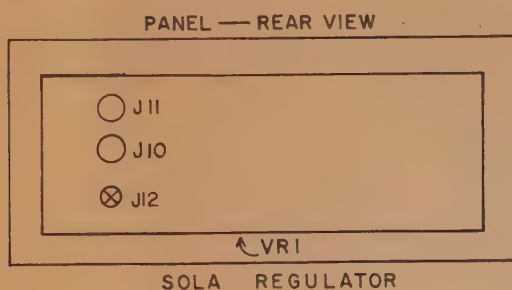
NOTE:
LINE VOLTAGE = 7V

OUTPUT VOLTAGE AT NO LOAD



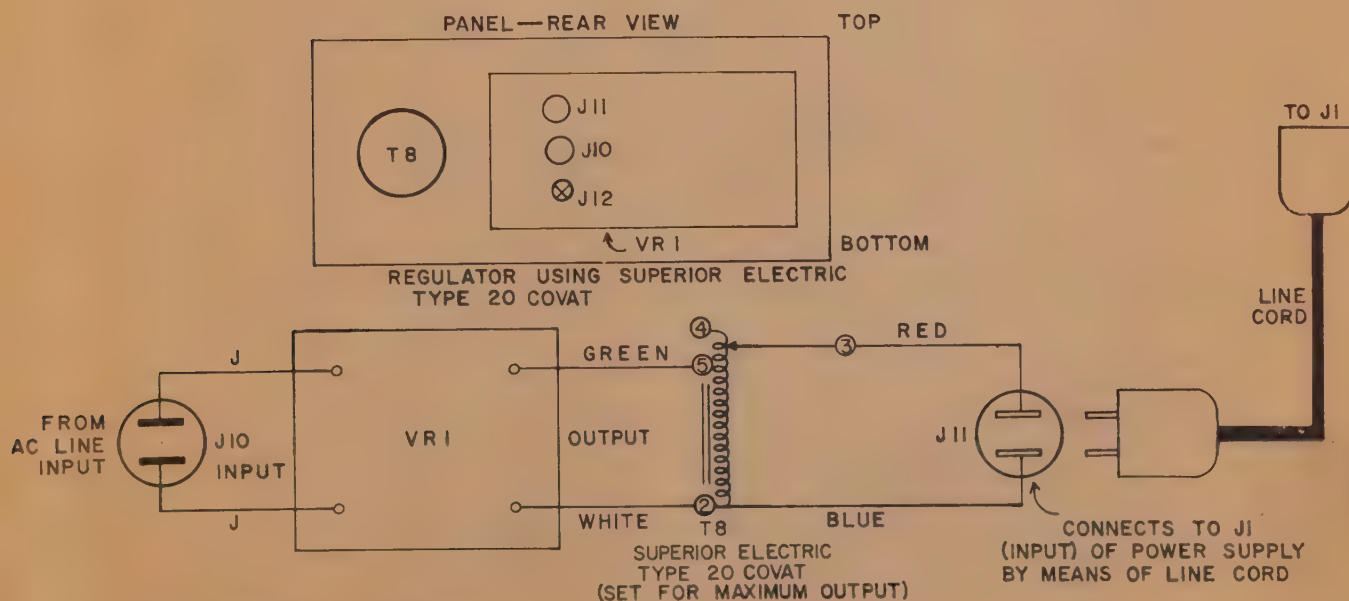
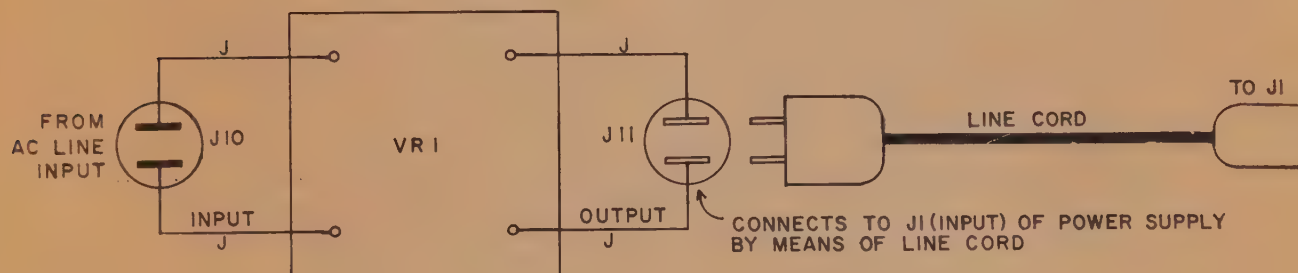
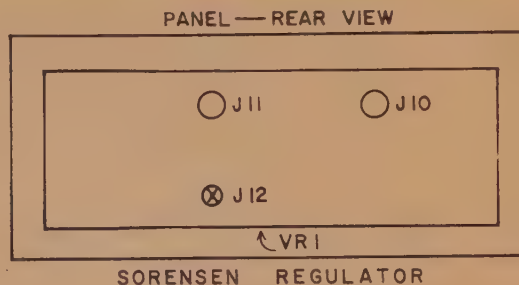
HIGH VOLTAGE CONTROL SETTING

NO	REVISION	BY	DATE	CI FEATURE—LINE VOLTAGE REGULATOR SCHEMATIC WIRING & PARTS PLACEMENT DRAWING	
①	J12 & J10 RELOCATED ON SOLA REGULATOR.	HC	8-21-57	DIMENSIONS IN INCHES DO NOT SCALE DRAWN BY SE 12/7/56 CHECKED BY <i>H. 12/10/56</i> APPR'D BY <i>E. S. M. 12/10/56</i>	
				BETA ELECTRIC CORP. NEW YORK 29, N. Y.  1000-7	



TOP

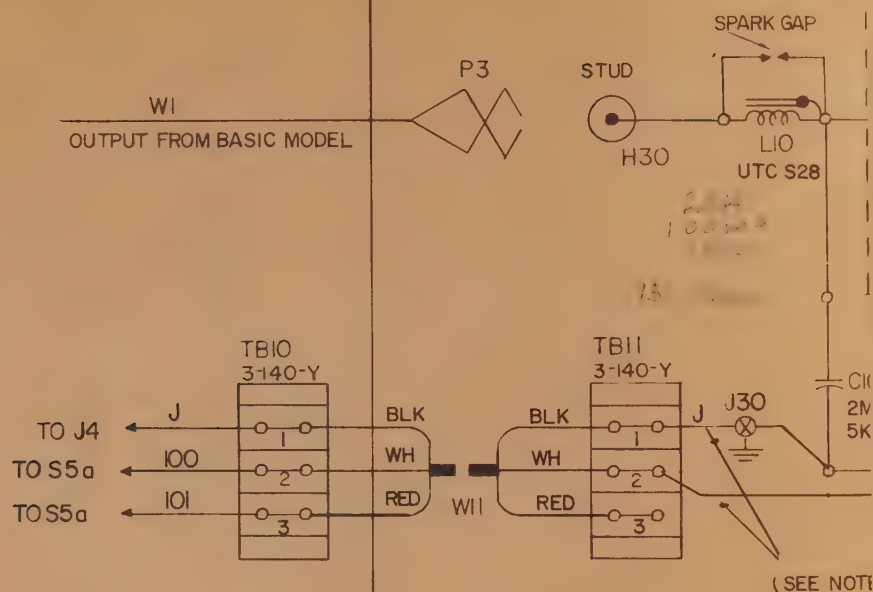
BOTTOM



J10—MALE RECEPTACLE—LINE INPUT
 J11—FEMALE RECEPTACLE—OUTPUT
 J12—GROUND STUD(USED ONLY WHEN VR1 IS NOT RACK MOUNTED)
 T8—SUPERIOR ELECTRIC TYPE 20 COVAT—OR EQUIVALENT
 VR1—LINE VOLTAGE REGULATOR—SOLA OR SORENSEN
 # 16 GA. BLACK WIRE USED FOR JUMPERS.

BASIC MODEL 1005-1QR&D

SCHEMATIC



①
NOTES: THIS DRAWING COVERS THE SCHEMATIC WIRING
& PARTS PLACEMENT DIAGRAMS FOR THE FILTER
SECTION ONLY. PLEASE NOTE HOW WIRES ARE
CONNECTED FROM THE BASIC MODEL TO THE
FILTER SECTION

② WHEN FILTER SECTION EMPLOYED WITH BASIC MODEL, REMOVE
R4, RELOCATE IN FILTER SECTION AND REDESIGNATE AS R30.

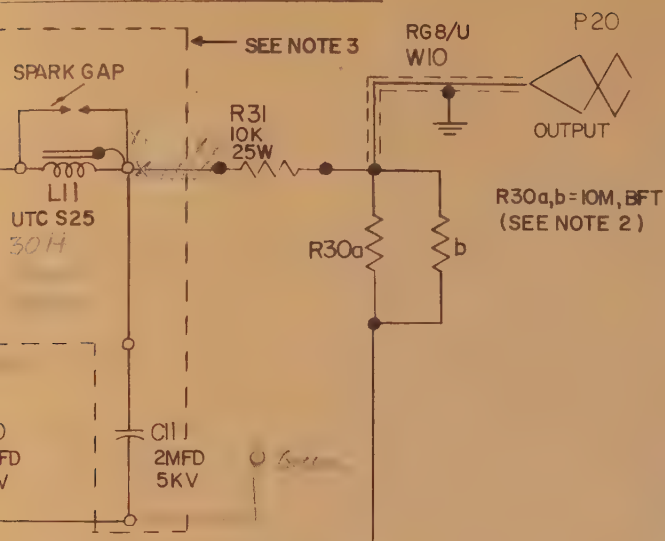
③ - L2 FEATURE INCORPORATES L11&C11

④ USE # 20 WIRE

⑤ IMPORTANT: FOR SERIAL NUMBERS BELOW 4/3694

THE FOLLOWING CHANGE SHOULD BE MADE ON THE BASIC MODEL:
REMOVE WIRE #100 FROM PRESENT TERMINAL ON SWITCH S5a AND
RELOCATE ON THE SWITCH TERMINAL HOLDING WIRE #30 AS PER
SCHEMATIC WIRING DIAGRAM.

WIRING DIAGRAM



4)

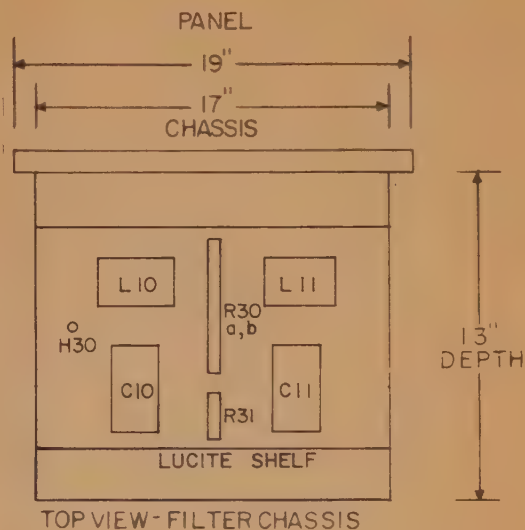
subassembly (plexiglass)

 x_2 

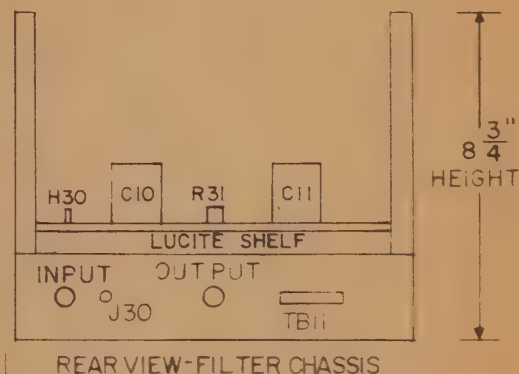
2. 216 225 234

1000000
1000000

PARTS PLACEMENT



TOP VIEW - FILTER CHASSIS



REAR VIEW-FILTER CHASSIS

REVISION	BY	DATE	FILTER SECTION, SCHEMATIC WIRING DIAGRAM & PARTS PLACEMENT	
			DIMENSIONS IN INCHES DO NOT SCALE	BETA ELECTRIC DIV. OF SORENSEN & Co INC NEW YORK 29, N.Y.
			DRAWN BY FR 5/28/57	
			CHECKED BY <i>ltc 10/8/57</i>	 1005-10-L1, L2-8
			APPR'D BY	

NO.	REVISION	BY	DATE		
	1000 Series parts			Models 1005-10R and 1005-10R&D Power Supplies	
	list.			DATE 2/28/57	BETA ELECTRIC CORP.  PARTS LIST. PAGE A
				TYPED BY: hk	
				CHECKED BY: Hc 2/1/57	
				APP'D BY	

PART NO.	BETA CODE NO. AND DESCRIPTION	LOCATION	FUNCTION
E40	Per β -a-40E.	Chassis	Overvoltage protection spark gap.
J5,6	62J E.F. Johnson #105-703.	Chassis	Polarity reversal.
F5,6	63P E.F. Johnson #105-303.	Chassis	Polarity reversal.
TB5	4TB Precision Metal Products #2604 terminal board.	VR tube bracket on panel	Mounts components.

INSULATION MATERIAL USED:

1 pc. 1/2 x 7-1/16 x 16-7/8" lucite shelf--choke, capacitor.
 1 pc. 1/2 x 7-1/16 x 16-7/8" lucite for rectifiers.
 1 pc. 3/8 x 3-1/4 x 6-9/16" glastic capacitor support.
 1 pc. 1 x 2-5/16 x 3-11/16" lucite shorting mechanism support.

NO.	REVISION	BY	DATE		
	Filter Section (L1,L2)			Model 1005-10 Power Supply L1, L2 features	
	addenda page, for use			DATE 6/4/57	BETA ELECTRIC CORP. DIV. OF SORESEN & Co., INC.
	with 1000 Series Parts			TYPED BY: rra	
	List.			CHECKED BY: Hc 10/8/57	 PARTS LIST, PAGE 1
				APP'D BY	

PART NO.	BETA CODE NO. AND DESCRIPTION	LOCATION	FUNCTION
A12	21A Panel, 8-3/4" (blank, W.E. notching)	Filter section	Filter panel.
A13	11A Chassis, 8-3/4"	F.S.	Filter chassis.
A14	13A Chassis cover, 8-3/4".	F.S.	Filter chassis cover.
C10, L1*	24C 2 mfd, 5 kv	Fil.cha.	Filter capacitors.
H22, 23	77H Handles, Precision Metal #2102.	Fil.panel	Carrying handles.
H30	24H Anti-corona, #8-32.	H.V.shelf	Tie point for high voltage output.
J23, 24	51J Birnbach #403 banana jack.	Fil.cha.	Multiplier resistor connectors.
J30	105J ICA type 631 binding post.	Fil.cha.	Ground.
L10	2L Choke, UTC #S-28, 20 henries, 100 ma.	Fil.cha.	Filter chokes.
L11**	2L Choke, UTC #S-25, 30 henries, 30 ma.	Fil.cha.	Filter choke.
P20	105P Battery clip, Mueller 27. W10		Output connector.
R31	6R 10K ohm, 25 watt resistor, 10% tolerance.	Fil.cha.	Short circuit current limiter.
W10	Cable, 8 ft. RG 8/U.		Filter output cable.
W11	11W 3 ft, 3 conductor, neoprene jacket.		Interconnects basic & filter chasis.
TD11	Terminal strip, Cinch Jones #3-140-Y.	Fil.cha.	Interconnects to basic unit.

* C10 only used for L1 feature; both C10 and C11 used for L2 feature.

**L10 only used for L1 feature; both L10 and L11 used for L2 feature.

NO.	REVISION	BY	DATE	Cl-250-1 Parts list	
				DATE	BETA ELECTRIC CORP.
				8/21/57	DIV. OF SORESENSEN & Co., INC.
				TYPED BY:	
				rra	
				CHECKED BY	
				Hc 10/8/57	
				APP'D BY	
					 PARTS LIST, PAGE 1

PART NO.	BETA CODE NO. AND DESCRIPTION	LOCATION	FUNCTION
A16	21A Panel, 8-3/4" (Blank W.E. Notching)		Panel for line voltage regulator.
J10	100J Receptacle, Per J1	On VR1	Line voltage regulator input.
J11	101J Receptacle, Per J2.	On VR1	Line voltage regulator output.
J12	105J Binding post, Per J4.	On VR1	External ground connector.
W4	1W AC Line Cord, 6,2 Conductor, #18 wire.		Connects line voltage regulator to chassis.
VR1	Sola Cat. #23-13-125 250VA Line voltage regulator - Type CVH	On Panel	Line voltage regulator.

